USACHPPM
Readiness thru Health
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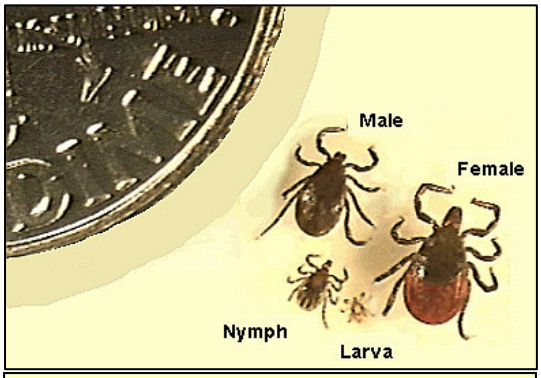
# Just the Facts...

## Babesiosis

**Q. *What is babesiosis?***
**A.** Babesiosis is a potentially severe, and sometimes rapidly fatal, tick-borne illness caused by a protozoan parasite that infects and destroys the red blood cells. *Babesia microti* appears to be responsible for the majority of cases of human babesiosis in the United States. It is the most common species in the eastern and Midwestern U. S. where most cases occur. Additional types of *Babesia* that have been associated with human disease in limited areas of the U.S., but that have not yet been designated as distinct species, are currently known only as *Babesia* isolate type WA1 parasites (detected on the West Coast) and *Babesia* isolate type MO1 (detected in Missouri). *Babesia divergens* is the most common species in Europe. Other *Babesia* species cause illness in animals.

**Q. *How does a person get babesiosis?***
**A.** You can get babesiosis if you are bitten by a tick that is infected with *B. microti*, or less commonly, another *Babesia* species. Protozoa in the tick's saliva are transmitted to you while the tick is feeding. An infected tick must be attached to you for at least several hours (usually 24-48) in order for transmission to take place. Occasionally, cases of babesiosis have also been acquired via blood transfusion from apparently healthy (asymptomatic, lacking symptoms), but nevertheless infected, individuals.



***Ixodes scapularis*** **(blacklegged tick, a.k.a. 'deer tick') is responsible for transmitting most cases of human babesiosis in the United States.**

**Q. *Do all ticks transmit babesiosis?***
**A.** No. Only certain species of ticks are capable of transmitting *Babesia*. There are two vectors (transmitters) of *Babesia* to humans in the United States. *Ixodes scapularis,* the blacklegged tick (also known as the "deer tick"), is the primary vector for *Babesia* in the east and Midwest, while *Ixodes pacificus*, the western blacklegged tick, is a presumptive vector along the West Coast. *Ixodes ricinus*, sometimes referred to as the sheep tick or European castor bean tick, transmits *B. divergens* in Europe. Simultaneous infections with both *B. microti* and *Borrelia burgdorferi*, the agent of Lyme disease, have been documented in ticks, and there is evidence that both organisms may be transmitted during a single tick bite.

**Q. *How do ticks acquire Babesia?***
**A.** Ticks become infected by feeding on an infected animal known as a reservoir host. Reservoir hosts carry *Babesia* parasites in their bloodstream for a prolonged period of time, thus causing ticks that feed on them to become infected. Then, when the infected tick feeds on its next host, parasites are passed on to that host and the cycle of infection continues. Rodents, especially the white-footed mouse (*Peromyscus leucopus*), are the reservoir hosts for *B. microti*, while in Europe, cattle serve as the reservoir hosts for *B. divergens*.

**Q. *How prevalent is babesiosis?***
**A.** Within the United States, human babesiosis does not appear to be geographically widespread. It is difficult to assess the true prevalence of the disease because it has not been designated as a nationally reportable illness to the Centers for Disease Control and Prevention (CDC). Also, it is suspected that many cases go undiagnosed because of the lack of symptoms in many individuals. Since the first cases were recognized in California in 1966 (unknown *Babesia* species) and Massachusetts (Nantucket) in 1969 (*Babesia microti*), several hundred cases have been documented. The majority of these cases have occurred in southern New England, especially on the coastal islands of Massachusetts (Nantucket, Martha's Vineyard), Rhode Island (Block Island), and New York (Shelter Island, Long Island). Cases have also been reported in California, Connecticut, Missouri, New Jersey, Washington, and Wisconsin.

**Q. *What are the symptoms of babesiosis?***
**A.** Based on serologic (blood) studies, most infections appear to be asymptomatic. Manifestations of symptomatic disease include fever, headache, chills, sweating, muscle aches (myalgias), fatigue, nausea, vomiting, enlarged spleen and liver (sometimes resulting in jaundice), and hemolytic anemia (anemia due to the destruction of red blood cells). Symptoms usually occur 1 to 4 weeks following an infective tick bite, and can last for several days, weeks, or months. The disease is more severe, and sometimes fatal, in patients who are immunosuppressed (have a weakened immune system), lack a healthy spleen, or who are elderly. In some cases, parasites may continue to circulate in the blood of asymptomatic individuals for several months or even years, making transmission of babesiosis by blood transfusion a concern. Because there have been documented cases of transfusion-acquired babesiosis, the American Red Cross does not accept blood donations from anyone who has ever had babesiosis, even if they have been treated with appropriate antibiotics. Co-infection with Lyme disease has been documented in some patients. Co-infection may complicate diagnosis and treatment, and may result in more severe illness in the individual.

**Q. *How is babesiosis diagnosed?***
**A.** Most patients do not remember a tick bite. Diagnosis is usually made by examining blood smears under a microscope and detecting *Babesia* within the red blood cells. *Babesia* appear as tetrad (cross-shaped) or ring-shaped forms, but may be very difficult to distinguish from the *Plasmodium* parasites that cause malaria. Therefore, a combination of diagnostic criteria may be useful. An

indirect immunofluorescent antibody assay (IFA) test can be used to detect *Babesia*-specific antibodies in the blood. Serologic diagnosis is established by a four-fold or greater rise in the serum titer between the acute (early) phase and the convalescent (late) stage. In addition, patient blood can be inoculated into hamsters to observe resultant infection in these animals after 2 to 4 weeks. In some cases, polymerase chain reaction (PCR) may also be used to detect *Babesia* DNA in the blood. Because some patients may be co-infected with Lyme disease (10-25%), blood tests should also be performed for this infection. It is important to diagnose and treat both infections.

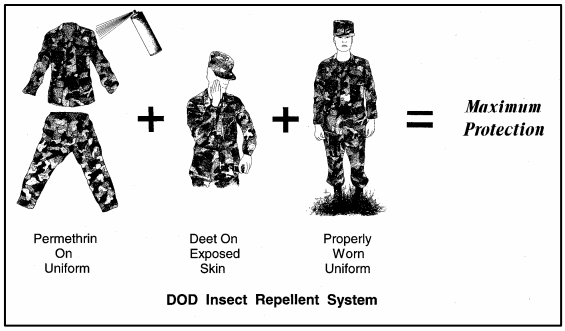
***Q. What is the treatment for babesiosis?***

**A.** There are no standardized treatments for babesiosis. However, the following drug regimens have been found to be useful: quinine (650 mg 3 times/day) **plus** clindamycin (600 mg 3 times/day or 1.2 g intravenously 2 times/ day) for 7-10 days (the dosages for children are quinine 25mg/kg **plus** clindamycin 20-40 mg/kg, both given in 3 divided oral doses for 7 days), **OR** azithromycin (600 mg 1 time/day) **plus** atovaquone (750 mg 2 times/day) for 7-10 days (the dosages for children are azithromycin 12 mg/kg 1 time/day **plus** atovaquone 20 mg/kg 2 times/day, for 7-10 days). Although all of these drugs are approved, the U.S. Food and Drug Administration currently considers clindamycin, azithromycin, and atovaquone investigational for babesiosis. Patients who exhibit only mild symptoms may require no specific therapy. Severely ill patients with a high percentage of infected red blood cells, on the other hand, may benefit from exchange transfusion (removal of the patient's infected blood, followed by replacement with clean, donated blood). Dialysis may be required for patients with kidney failure.

***Q. What can I do to reduce my risk of becoming infected with babesiosis?***

**A.** There is no vaccine against babesiosis. Therefore, you can help prevent babesiosis, and other tick-borne diseases, by protecting yourself from ticks. When in tick habitat (tall grass and weeds, scrubby areas, woods and leaf litter), follow these precautions:

- Wear proper clothing as a physical barrier against ticks – long pants tucked into boots or tightly-woven socks; long sleeve shirt; shirt tucked into pants; and light-colored clothing so as to more easily spot ticks.
- Check your skin and clothing periodically for ticks.
- Use both skin and clothing repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
  - For your skin, use a product that contains 20-50% **DEET** (N,N-diethyl-meta-toluamide). **DEET** in higher concentrations is no more effective.
  - Use **DEET** sparingly on children, and don't apply to their hands, which they often place in their eyes and mouths.
  - Apply **DEET** lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
  - To apply to your face, first dispense a small amount of **DEET** onto your hands and then carefully spread a thin layer.
  - Wash **DEET** off when your exposure to ticks, mosquitoes, and other arthropods ceases.
  - For your clothing, use a product that contains **permethrin. Permethrin** is available commercially as 0.5% spray formulations.
  - **Permethrin** should only be used on clothing, never on skin.
  - When using any insect repellent, always FOLLOW LABEL DIRECTIONS. Do not inhale aerosol formulations.
- For optimum protection, soldiers should utilize the **DOD INSECT REPELLENT SYSTEM**. In addition to proper wear of the military combat uniform (e.g. ACUs, BDUs) (pants tucked into boots, sleeves down, undershirt tucked into pants), this system includes the concurrent use of both skin and clothing repellents:
  - Standard military skin repellent: 33% **DEET** lotion, long-acting formulation, one application lasts up to 12 hours, **NSN 6840-01-284-3982**.
  - Standard military clothing repellents: either aerosol spray, 0.5% **permethrin**, one application lasts through 5-6 washes, **NSN 6840-01-278-1336**; or IDA (impregnation kit), 40% **permethrin**, one application lasts the life of the uniform (approx. 50 washes), **NSN 6840-01-345-0237**.




***Q. What should I do if I find a tick attached to my skin?***

**A.** Remove attached ticks as soon as they are found. Use tweezers to firmly grasp the tick's mouthparts up against the skin, and pull back firmly and steadily. Be patient – the tick's central mouthpart called the hypostome is covered with sharp barbs, sometimes making removal difficult. Don't pull back sharply, as this may tear the mouthparts from the body, leaving them embedded in the skin. If the mouthparts do break off, don't panic – the mouthparts alone cannot transmit disease because the infective body of the tick is no longer attached. However, to prevent secondary infection, remove the mouthparts as you would a splinter. Never squeeze the body of the tick or use such things as petroleum jelly, fingernail polish remover, or a lighted match: these methods could force more infective fluid into the skin. After removal, wash the wound site, and apply an antiseptic. Preserve the tick by placing it in a clean, dry jar, or other well-sealed container, and keeping it in your freezer. Should you develop disease symptoms, take the tick with you to the physician's office; identification of the tick species may assist the physician with your diagnosis and treatment. [Military clinics can send ticks that have been removed from patients to the USACHPPM for identification and analysis (contact the address, below)]. You may discard the tick after one month; all known tick-borne diseases will generally display symptoms within this time period.

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